Towards a European Research Area Network (ERA-NET) on Marine Biotechnology Discussion paper

Deliverable 4.2

- Discussion paper: Marine Biotechnology ERA-NET

Part of Task 4.1 and 4.3

- Produce a discussion paper on an ERA-NET in Marine Biotechnology
- Develop the starting point for an ERA-NET

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1 Introduction

This document should be considered as a discussion paper to support the CSA MARINEBIOTECH Strategic Forum of funding agencies in developing a strong proposal in response to the FP7 call for an ERA-NET in the area of Marine Biotechnology (see call text in Annex 1). It presents a range of considerations and options for the format, content and approach for a potential future ERA-NET on Marine Biotechnology (suggested working title ERA-MBt).

Throughout the process, it will be important to ensure that the development of the ERA-MBt is based on a common understanding of what Marine Biotechnology is (see considerations about the definition of Marine Biotechnology in Annex 2 and 3).

While options for the focus, approach and format of a potential ERA-MBt are addressed below, a few guiding principles can already be made as orientation for the interested funding agencies.

The ERA-NET should:

- avoid duplication of past and on-going efforts (see Annex 4 for a shortlist of key science policy initiatives and documents);
- ensure complementarity with other initiatives and projects;
- take into account specific marine biotech research/knowledge needs of other actors, platforms and initiatives and where relevant aim to satisfy those needs (i.e. identify and fill the gaps);
- establish interactions with related ERA-NETs, ETPs and other initiatives across the marine and other relevant sectors;
- aim to identify and support activities which will be most effective, where the return on investment does not have to be in monetary terms, e. g. ELSA activities;
- set up cooperation tools and pool resources for collaborative research at European scale; and
- take into account global trends and identify areas where Europe could benefit from collaborating with international initiatives or partners.

As an overarching rationale an ERA-MBt:

- must make an important contribution towards meeting the 'Grand Challenges' of the 21st century and the development of greener, smarter economies that are central components of the Europe 2020 Strategy; and

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- must be a strong driver for the development of the European bioeconomy as laid out in Bioeconomy 2030 - the European Strategy for a Bioeconomy "INNOVATING FOR SUSTAINABLE GROWTH: A BIOECONOMY FOR EUROPE".

The aims of the ERA-MBt should, therefore, correspond to the Vision for European Marine Biotechnology as formulated by the Marine Board-ESF (see information box 1).

Information Box 1. A Vision for Marine Biotechnology in Europe

By 2020, an organised, integrated and globally competitive European Marine Biotechnology sector will apply, in a sustainable and ethical manner, advanced tools to provide a significant contribution towards addressing key societal challenges in the areas of food and energy security, development of novel drugs and treatments for human and animal health, industrial materials and processes and the sustainable use and management of the seas and oceans.

Source: Marine Board Position Paper 15 (2010) *Marine Biotechnology: A New Vision and Strategy for Europe | available from* www.marineboard.eu/publications

This discussion paper presents some considerations and recommendations for the development of a proposal for a potential ERA-MBt based on following underlying questions:

a) What should the ERA-MBt do?

b) How should the ERA-MBt do it?

c) What should be the impact of a successful ERA-MBt (i.e. who will use and benefit from its outputs)?

The paper takes into account key preparatory documents such as the European Commission Collaborative Working Group on Marine Biotechnology (CWG-MB) scoping paper, the Marine Board-ESF's Position Paper 15, and a range of other high level European and international reports on strategic research in Marine Biotechnology (see Annex 4). It builds on preparatory activities of the CSA MARINEBIOTECH, notably the comments of the stakeholders and funding organisations made during the two CSA MARINEBIOTECH Workshops[1] held in Olhaõ (26-27 April 2012) and Hamburg (8-9 October 2012) and the preliminary results of the landscape profiling activities (notably Deliverables D3.4, D3.5 and D3.6 of Work Package 3).

A first draft of this paper was presented at the 2nd CSA MARINEBIOTECH Workshop (Hamburg, 8-9 October 2012) to the Strategic Forum of Funding Organisations and

[1] See public reports of the CSA Workshops at www.marinebiotech.eu

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stakeholders to stimulate discussions and gather additional ideas for shaping an ERA-NET in the area of Marine Biotechnology. The main comments and outputs of this Workshop are taken onboard and integrated into the final version of this document.

The paper is in the first place intended for the ERA-NET consortium partners to consider and further explore possible options for the format, content and structural basis of an ERA-NET in Marine Biotechnology. As such it aims to support their endeavours to build a growing network of European Research Funding Organisations (RFOs) and programme managers in the area of Marine Biotechnology and contribute to the development of a thriving European Marine Biotechnology Research Area.

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2 The call text for an ERA-NET on Marine Biotechnology

Before exploring the possibilities and focus of an ERA-NET in the area of Marine Biotechnology it is important to consider carefully the text of the call. A successful proposal will always be guided by, and adhere to, the requirements of the call.

The full call text is given in Annex 1. The main elements are:

- **The overall aim** should be to
    - further increase the level of coordination between European research funding bodies in the area of Marine Biotechnology;
    - seek complementarities between national activities; and
    - pool resources to undertake joint funding of transnational projects.
- **Prioritisation of ERA-MBt activities** should
    - build upon previous initiatives and capitalise on its achievements:
        - the analysis of the current landscape in Europe and beyond;
        - the mobilisation of key stakeholders;
        - the set up of initial cooperation tools to develop joint programmes and pool resources for collaborative research at European scale.
    - seek complementarity with other FP7 initiatives and establish interactions with related ERA-NETs and ETPs across the marine and relevant sectors;
    - consider/analyse opportunities for future global initiatives in the area of Marine Biotechnology;
    - seek to expand the previous ERA-NET preparatory action membership to include new funding bodies from other Member States and Associated Countries.
- **Research collaborations** should
    - tackle scientific and industrial challenges in strategically-important areas of Marine Biotechnology;
    - better integrate and rationalise existing infrastructures and databases;

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- address the important role of Marine Biotechnology for the development of related industries (spillover effects and integration with other biotechnology and industries).

- **Expected impact:** the ERA-NET should
  - lead to greater integration of research actors and activities from across the enlarged European Union, and the candidate countries;
  - consolidate the basis for further coordination efforts in the area of Marine Biotechnology;
  - seek for complementarities between national activities, and start pooling resources for funding and implementing future research activities in a synergistic manner;
  - lead to a self-sustainable and long lasting network of programme managers;
  - support and enhance the ERA in the field of Marine Biotechnology.

- **Eligibility and evaluation**
  - Only legal entities which finance or manage publicly funded national or regional programmes are eligible for participation – it is therefore critical that these organisations are committed to participate as partners in the ERA-NET. Possibility for subcontracting specific tasks might be an option but will need to be carefully considered and cleared by the Commission.

One first important observation is that the call text is fairly generic and does not deviate much from other ERA-NET calls. While it refers to Marine Biotechnology and the need to avoid overlap with other initiatives, it is not prescriptive in terms of focus or orientation. This leaves considerable margin for the ERA-NET consortium to define where added value can and should be developed and how this should be achieved (see also the ERA-NET Orientation Paper in Annex 3).

The key elements or requirements in terms of the stipulated aims provide guidance to the kind of activities and tasks that the ERA-NET will need to take on.

Firstly, further increasing the level of coordination between European research funding bodies in the area of Marine Biotechnology will need the development of an appropriate forum or interaction mechanisms, which does not only serve project goals, but serves the more broader function of an information exchange platform for funders and programme managers to exchange ideas, lessons learned and to formulate best practices. This should be an open platform which would allow non-partner funding agencies to participate and

contribute as the call stipulates the necessity to further expand the network of funding agencies beyond those participating in the CSA MARINEBIOTECH and even the partners of the eventual ERA-NET. This calls for flexible mechanisms to include new funding bodies from other Member States and Associated Countries throughout the project duration.

Secondly, the ERA-NET will need to identify complementarities between national activities. This calls for further work on mapping the marine biotech RTDI landscape as initiated by the CSA MARINEBIOTECH building on it without repeating its efforts[2]. Emphasis should therefore be on obtaining information that is functional in terms of the ERA-NET, which means a clear focus on identification of concrete areas of common interest between national funding agencies, to release complementarities and potential synergies.

Thirdly, work should be done towards pooling of resources and joint funding of transnational projects. Proposals for opening access and common usage of resources (e.g. research infrastructures, human capacities, biological and data repositories), will require a targeted identification of which resources are suitable and mechanisms for opening these up to common usage. Support for Joint Calls will need to be based on the targeted identification of relevant topics which should be prioritised in terms of their European strategic relevance.

As the call indicates, ultimately, the cooperation should lead to a self-sustainable and long lasting network of programme managers in the area of Marine Biotechnology. This means that sufficient efforts should be undertaken to develop appropriate mechanisms to support this long lasting network beyond the project duration.

The possible project activities focus and modalities are further discussed in the following chapters.

[2] See CSA MARINEBIOTECH Deliverable D3.5 Inventory report of Marine Biotechnology RTDI in Europe and country profiles available on www.marinebiotech.eu

3 High level aim and objectives of the ERA-NET

At the outset, the CSA MARINEBIOTECH Strategic Forum (i.e. the funding agencies), and in particular the subset of funding organisations committed to developing and participating in a future ERA-NET, will need to consider the high level aim and objectives of a future ERA-NET in the area of Marine Biotechnology (ERA-MBt). The consortium should take into account the general objectives of the ERA-NET instrument (see Annex 5), the discussions that already took place in expert groups such as the Marine Board Working Group on Marine Biotechnology[3], the EC Collaborative Working Group on Marine Biotechnology (CWG-MB)[4] and the CSA itself, as well as draw from various other similar ERA-NETs.

According to the call text (Annex 1) the overall aim of the ERA-NET should be to:

- further increase the level of coordination between European research funding bodies in the area of Marine Biotechnology;
- seek complementarities between national activities;
- pool resources to undertake joint funding of transnational projects

These are goals which are fairly generic to the ERA-NET instrument. The ERA-MBt will need to elaborate a more concrete high-level formulation which corresponds to the elements provided in the call text, but which is tailored to the specific requirements of European Marine Biotechnology.

Possible elements and formulations that might be considered as basis for the high level aims of the ERA-MBt include:

- Stimulate the development of, and improve coordination between, national Marine Biotechnology research strategies and funding programmes. Stimulate the development, quality & efficiency of national Marine Biotechnology R&D programmes. Improve the coherence between Marine Biotechnology strategies and programmes and provide impetus to align them at the European, regional and national level.
- Facilitate better co-operation in addressing shared opportunities and challenges in the area of Marine Biotechnology research.
- Deliver improved coordination in the use of existing resources and capacities (infrastructures, equipment and human and intangible knowledge capital resources).

[3] See Marine Board Position Paper 15 on Marine Biotechnology available from www.marineboard.eu/publications

[4] See Background and recommendations on future actions for integrated Marine Biotechnology R&D in Europe http://www.marinebiotech.eu/csa-mb-publications

- Bridge identified gaps and avoid duplication.
- Jointly fund strategic projects of mutual interest.
- Progress the establishment of the Marine Biotechnology component of the European Research Area (ERA).
- Increase Europe's competitiveness in the area of Marine Biotechnology to ensure Marine Biotechnology becomes a key contributor to the Knowledge Based Bio-Economy (KBBE) in Europe.
- Provide a platform for long-lasting collaboration and cooperation among and between funders and the private and academic research communities.

The overarching aims or goals of the ERA-NET should be underpinned by a clear set of more operational objectives. These operational objectives determine the activities and direct outputs targeted by the project and as such guide the breakdown of the project work (i.e. the set of specific Work Packages, Tasks, Deliverables and Milestones that will need to be completed during the project). The achieving the operational objectives should provide a significant contribution towards realising the targeted overarching aims.

The CSA MARINE BIOTECH Orientation Paper *The specificities of an ERA-NET in Marine Biotechnology* (see Annex 3), developed as an informal discussion paper after the first CSA Workshop, already provided potential guiding direction to position an ERA-MBt. The document suggests that *an ERA-NET in Marine Biotechnology should be placed in the European Research Area to support and strengthen the availability and development of cutting edge biotechnology tools and knowledge which needs to be developed in close collaboration with other activities and the industries, and in close interactions with the users where the "technology push" and the "market pull" are in dynamic interaction.* The orientation paper provides a first list of potential objectives for the ERA-MBt which will need to be developed in close collaborations with other programs in the ERA such as:

- Stimulate innovative, new ways to use biotechnology tools to drive the knowledge and technology forward.
- Develop biotech tools in cutting edge projects.
- Tackle the needs of researchers and stakeholders in ensuring that the toolbox already available today is used more efficiently, effectively and applied in more projects.
- Identify specific gaps where Marine Biotechnology needs additional focus to develop areas considered, but not sufficiently included, in other activities (e.g. biodiscovery, marine model organisms, …).
- Facilitate or improve access to biodiversity, addressing IPR, sustainability challenges and Ethical Legal and Social Aspects (ELSA).

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- Disseminate the uses and possibilities embedded in an enabling technology such as marine biotech.

When further developing the operational objectives of the ERA-MBt, potentially relevant objectives may be discussed and considered:

- Develop a framework for the future ERA-MBt based on (i) the vision/strategy developed in other strategic documents (e.g. EC KBBE-NET CWG-MB scoping paper and Marine Board Position Paper 15) and (ii) the stakeholder recommendations and preparatory work of the CSA MARINEBIOTECH.
- Create and maintain a strong network of programme owners and managers to share information on national/regional MBt programmes/projects as well as relevant policies, to exchange ideas and develop best practices guidelines.
- Align the network with other initiatives in the field of marine and biotechnology research and the KBBE.
- Set-up a structured stakeholder advisory mechanism to provide guidance to the ERA-MBt strategic work and to assist with the identification and prioritisation of critical R&D needs.
- Develop a robust and transparent mechanism to identify R&D areas of common interest among European countries.
- Respond to the identified needs of the research community (including industry) and areas of common interest with coordinated, joint actions (e.g. Joint Calls).
- Optimise efficiency of procedures for Joint Calls, to make them suitable for a future self-sustained network.
- Manage funded projects together, with status seminars and expert evaluations.
- Develop a long term Communication Strategy, with relevance beyond the life-time of the ERA-MBt, to mobilise a European Marine Biotechnology research community using the Marine Biotechnology portal as the central and long term binding tool offering relevant high quality information and community services.
- Disseminating, at European, regional and national level, the results of the ERA-MBt and in particular the results of R&D funded in its framework, and contributing to communicating the role and benefits of Marine Biotechnology to the wider research and business community, various policy levels and the general public.

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4 Important issues to consider when developing the ERA-NET proposal

A considerable amount of strategic and preparatory work has already been done leading up to the launch of the FP7 Call for an ERA-NET in Marine Biotechnology. Based on these previous science policy initiatives and discussions within the framework of the CSA MARINBIOTECH, a number of important issues have been highlighted that, when developing the ERA-MBt proposal, require particular attention:

- **Linking to other initiatives**

Positioning an ERA-NET in Marine Biotechnology in the wider European research, technology and policy landscape will be critical. To this end, the CSA MARINEBIOTECH Coordinator (Research Council of Norway) has developed an informal working document to consider the specificities of an ERA-NET in the area of Marine Biotechnology, to stimulate the dialogue between funding agencies and to develop a common understanding of the niche that the ERA-MBt should occupy in order to deliver a clear added value (see orientation paper in Annex 3). This will have an important bearing on the positioning of the ERA-MBt and, as such, the approach of the ERA-NET consortium/proposal and ultimately the success of its implementation and outputs.

- **How to build the consortium and proposal for an ERA-MBt, ensuring appropriate involvement of stakeholders?**

Given the wide participation of a range of Research Performing Organisations (RPOs) and stakeholders from various backgrounds in the CSA MARINEBIOTECH, the question was raised as to who should be involved in the development of the proposal and how it should be done. During the CSA Workshops, it was recommended that the development and drafting of the ERA-MBt proposal should be based on a specific workplan detailing the way (and by whom) the proposal will be developed. This workplan has to be developed by the coordinator of the consortium in close collaboration with the ERA-NET consortium.

The ERA-NET consortium will need to take full responsibility for the development of the proposal and execution of the tasks following the workplan. It is, however, advisable that the consortium takes into account the recommendations of the CSA partners and the advice of the Stakeholder Group (see Annex 6). Individual members with specific expertise may be called upon during the process to provide advice on how to elaborate certain aspects of the proposal, e.g. in terms of industry interaction and involvement, specific MBt IPR issues, scientific focus areas, etc.

Specific consideration should be given to the potential future role in the ERA-MBt of the Stakeholder Group established in the framework of the CSA MARINEBIOTECH. This should be based on the understanding that the stakeholders may provide an important function to

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advise on trends and developments, to help the ERA-NET partners to understand the stakeholder needs, and thus influence the desirable actions and outcomes of the ERA-NET. Their input will be important to ensure timeliness, relevance and context of collaborative research activities in Marine Biotechnology.

- **Identification and selection of priority topics**

The CSA MARINEBIOTECH Stakeholder Group raised many questions as to how and who will determine the topics for possible joint activities in the framework of ERA-MBt. While the mechanisms to do so still need to be developed, the Stakeholder Group recommended that such mechanisms should allow for sufficient consultation with stakeholders (see also point above on ensuring involvement of stakeholders). Also, the CSA MARINEBIOTECH Workshops highlighted that such an exercise should avoid all repetition of earlier work that has been done. For example, it was strongly highlighted that the Marine Board's Position Paper 15 has already adequately identified most of the relevant research gaps. Also, the EC Collaborative Working Group on Marine Biotechnology has already identified four high-level areas of common interest between a number of funding agencies. Preliminary analysis of some of the priorities of other European countries seems to confirm that these remain the most relevant areas in which to start looking for complementarities and possible joint activities.

- **Address IP, legal and policy matters specific to Marine Biotechnology research, development and commercialisation**

IP and legal barriers have been identified for a long time as issues of considerable concern that will need to be addressed to ensure that Marine Biotechnology lives up to the expectations and provides a lasting contribution to the KBBE. Several national and European projects have already addressed these issues but often at a very specific and detailed level. A new set of FP7 projects is now embarking on a much wider and more global approach to dealing with key legal, IP and policy issues in the biodiscovery pipeline. At least one of these projects (PharmaSea) will develop a user toolkit to navigate the different legal regimes in terms of accessing and sharing of benefits of marine genetic resources which will become a living document made available on the www.marinebiotech.eu portal (towards 2015). It will be important to ensure proper linkage with these projects and an adequate flow of information to avoid duplication of effort, seek synergies and mutually reinforce the work being undertaken.

- **Address infrastructures and in particular aspects related to data gathering and management**

Almost all strategic documents and exploratory stakeholder discussion point to the importance of addressing infrastructure issues. This is a particular area where European level collaboration might lead to the necessary economies of scale to create significant added value. This is also referred to in the call text. Given the fact that a number of other projects

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(e.g. EUROFLEETS, ASSEMBLES, EMBRC) and ERA-NETS (SEAS-ERA) already address European coordination in the use marine research infrastructures, it will be critical to identify specific European Marine Biotechnology infrastructure challenges and opportunities that are not yet dealt with elsewhere. Potential areas include, but are not limited to, marine biobanks, screening platforms and bio-informatics infrastructures. It was highlighted during the first CSA MARINEBIOTECH Workshop that European Technology Platforms may play an important role in speeding up access to, for example, access to screening and omics platforms.

- **Develop activities on human capacity building**

There are many options and relevant activities possible. The Stakeholder Group suggested that a list of relevant PhD courses in the EU would be useful as well as specific marine biotech summer schools and training courses. In particular, promoting 'work-place training' which combines academic training with or within industry would be interesting to consider as it allows compliance with the needs of industry. For example, training on photobioreactors should be improved and increased because trained personnel in this field is lacking.

Organising specific network activities such as workshops on technical issues or technical staff exchanges may be another area of relevant work, for example in relation to sampling techniques, operation of biobanks, data gathering and management, ICT support for marine biotech activities, etc. Positive experiences gained in other projects (e.g. ASSEMBLE) and teaming up with other initiatives such as EMBRC should be considered.

- **Consider issues on industry-academic cooperation and how to improve technology transfer**

There is general consensus among the various research, industry and policy stakeholders that there is a strong need to promote the development of new, and strengthen existing, links between scientists and industry. While this is not a problem confined to Marine Biotechnology, the specificity of marine research and the lack of traditional links with industry in many cases calls for specific approaches and increased attention. Such collaborations need to cover relevant parts of the value chain and cannot be seen separate from IPR issues as well as from the knowledge intensive and high tech nature of this area.

To foster successful academic-industry collaborations, the whole value chain should be considered pointing out where the highest needs are to bring complementary expertise together. Industry involvement at proof-of-concept stage would be beneficial and experiences from certain funding agencies may be helpful in this regard. For example, the Research Council of Norway has a programme set up to stimulate involvement of industry in the proof-of-concept stage which may serve as an example.

The Stakeholder Group has recommended building upon existing initiatives and experiences. For example, together with other partners the Eurocean-infobase has developed a

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knowledge transfer tool called Marine Knowledge Gate (see www.kg.eurocean) which could be a useful tool. At this stage it includes information sourced from 20 projects and 5 programmes worth about €52million. One observation is that FP7 has supported a much greater number of marine biotech projects running already compared to FP6, illustrating a growing recognition of its importance. There is an increasing number of SMEs that are involved in these projects. Other projects such as Marine Genomics for Users (MG4U) should also be taken into account.

- **Ensure that 'sustainability' is a key principle underpinning the ERA-MBt and all its activities/outputs**

Sustainability, environmental consciousness and conservation matters must become a common understanding, engrained in the ERA-MBt as an underlying cross-cutting element in all its activities and resulting initiatives.

- **Ensure proper attention to developing a European Marine Biotech Communication Strategy**

One of the key outputs of the ERA-MBt should be a long term Communication Strategy for European Marine Biotechnology research. This strategy should go much beyond the mere project dissemination and information management and make full use of the central e-hub: the European Marine Biotech portal **www.marinebiotech.eu.**

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5 Possible activities to be considered to achieve the high level aim and objectives

Rather than providing concrete suggestions for a structure or breakdown of work of a potential ERA-NET project in the area of Marine Biotechnology, this section provides a range of potential activities and tasks which may be taken onboard by such an ERA-NET, grouped in five high-level categories. These are based on the considerations developed in the previous sections of the document and include:

1. **Internal and external functioning / project management and coordination**

   - Ensure appropriate coordination of the project (based on standard project management and coordination tasks).
   - Strategically position the ERA-MBt in the ERA landscape and interact with relevant European and international partners to avoid duplication of efforts and explore synergies.

     To avoid any miscommunication or split in responsibilities, it is recommendable to include this task as part of the coordination WP and not as a separate WP – If it is considered it should be a separate work package it is critical that this WP is lead by the coordinator.

2. **Research project/programme level collaboration**

   - Organise *A posteriori* clustering workshops[5] based on positive experiences in other ERA-NETs (in particular MARINERA).

     Instead of developing opportunities for collaborations in new projects, these clustering workshops bring together principal scientists from existing national projects in a certain field of research. They are aimed at enhancing coordination between existing efforts and build foundation for future collaborative work by creating better links between researchers at existing project level. *A Posteriori* clustering workshops can be focussed on both specific scientific topics or technical topics (e.g. biobanks, sampling techniques, data management).
   - Select and fund new joint research activities (see below).
   - Activities in this area will need to be linked to funding and industry level collaboration activities and outputs (see points 3 and 4).

[5] A posteriori means (in this context) 'after the facts' or in other words presenting research from ongoing or recently ended projects

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3. Research funding organisation level collaboration

- Conduct further strategic analysis

    i. Further improve the mapping of national strategies, activities and priorities for Marine Biotechnology research (building on CSA MARINEBIOTECH Deliverables D3.4, D3.5 and D3.6).

    ii. Identification and selection of areas of common interest and priorities for joint activities congruent with national plans and funding possibilities. As confirmed by discussions at the first CSA Workshop in Faro, the research priorities are already well defined by the Marine Board-ESF position paper and not much work is needed on further defining them. The work should focus on selecting priorities where European transnational collaboration will be most desirable and effective, i.e. where transnational collaboration will "add value" to the participating partners/countries. This should build in particular upon the work of on high level areas as put forward by the EC KBBE-NET CWG-MB.

    iii. Identification and evaluation of opportunities for international cooperation. This will be important, in particular given that the OECD Global Forum on Marine Biotechnology (Vancouver, May 2012) identified international collaboration as one the areas for potential further work by the OECD so it is likely that somewhere down the line opportunities will arise from these activities.

- Identify policy barriers and enablers.

  It may be useful to consider policy barriers and enablers specific to Marine Biotechnology research, including those issues related to research collaboration as well as to joint funding. However, it is important that this should remain much focused on specific marine biotech aspects as considerable work has already been done on this topic already in the framework of other projects such as MarinERA and SEAS-ERA at a more generic level.

- Activities in this area will need to be linked to research and industry level collaboration activities and outputs (see points 2 and 4).

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4. Industry level collaboration

- Contribute to bridging the gap between academia and industry, including tasks such as:

    i. Examine barriers and enablers to industry-academia collaboration in the field of Marine Biotechnology.

    ii. Evaluate existing and new modes of collaboration and their requirements.

    iii. Consider issues related to joint funding and different collaborative models including public-private-partnerships, where necessary using experiences of other initiatives such as ERA-IB2.

    iv. Consider IPR issues (linking with on-going initiatives), including conservation of biodiversity and issues related to Access and Benefit Sharing (ABS).

    v. Explore venture capital flow to Marine Biotechnology R&D.

- Activities in this area will need to be linked to research and funding level collaboration activities and outputs (see points 2 and 3).

5. Enabling/Support actions AKA Cross-cutting issues

By far the most substantial work that the ERA-NET will need to consider is horizontal support actions which enable the realisation of the higher level aims of the project. These include:

- Develop a stakeholder platform as a soundboard and active partner in the project (see section 4 for specific comments).
- Develop appropriate capacity building activities (see section 4 for specific comments).
- Investigate options to promote sharing/pooling of resources including infrastructures and human/intangible resources.
- Develop a strong communication strategy/plan to guide communication, information outreach and dissemination activities.

  This is an important task as the lack of coherent and focused marine biotech strategies and programmes in many European countries highlight the need to increase the efforts to improve the visibility of the sector and communication of the relevance of supporting this area of research. Actions may include:

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i. Develop a communication plan for dissemination of project results, outreach and raising awareness and interest for Marine Biotechnology opportunities and challenges in Europe.

ii. Further shape and promote the www.marinebiotech.eu site as the portal for marine biotech in Europe.

iii. Execution of communication, dissemination and outreach activities based on the strategy/plan.

- Developing a strategic platform to exchange information about national developments, activities and experiences to create a mutual learning environment for governments to stimulate development of new coherent national and regional strategies for Marine Biotechnology research (or improve existing ones) – this could/should be integrated into the marine biotech webportal.
- Formulate a number (e.g. 10) of template "Research topics" which can be readily taken up by research funding organisations at the national and European level. This will require prioritisation, but would allow to promote active research collaborations well beyond what can be funded by the ERA-NET itself.
- Developing Joint Calls for funding

  i. Consider barriers to cooperation and work towards common procedures (see also above in RFO collaborations).

  ii. Develop and implement a robust and transparent mechanism to select topics for Joint Calls.

  iii. Implementation of Joint calls should be a goal of the project. However, as it involves complex and ambitious tasks, it is highly recommendable to ensure building in enough fail-safes and fall-back options should it be impossible to realise desirable targets that are dependent on external factors. For example, in the given economic climate it might not be possible for many countries to secure funding for participation in a joint call. Should this be the case, there should be mechanisms that would allow developing a number of fruitful collaborations and outputs to ensure successful outcomes of the project even if no actual projects are jointly funded.

- Supporting work towards common programmes.

  Based on experiences in other ERA-NETs it appears that fully developing common programmes is far too ambitious to be done within the framework of an ERA-NET. This is particularly the case in this area given the disparity between the different

countries in the level and focus of support for Marine Biotechnology and the general lack of national dedicated marine biotech research programmes. However, the ERA-MBt may develop activities that might provide useful information and support eventual work towards common programmes further down the line (in later projects or common programming initiatives).

- Development of a research plan and/or Strategic Research Agenda (SRA) for European Marine Biotechnology Research.

  While developing a SRA for Marine Biotechnology is certainly an option, there are also important risks associated with it which need to be considered. First, it needs to be very clear what exactly is understood by an SRA. Different people understand different things under this header and some interpretations overlap with outputs of previous activities. Secondly, given the amount of preparatory work in developing a Vision and Strategy for European Marine Biotechnology research with concrete research priorities and recommendations (MB Position Paper 15) and other scoping efforts (CWG-MB) it is important that these efforts are not duplicated.

  It is therefore critical that an SRA, if developed, is very specific and is developed with a clear purpose (it should detail per recommended action what should be done, how it should be done and who should do it using SMART criteria). In this context it is important to consider whether there will be a client for the SRA? In other words: is somebody waiting for an SRA? If an SRA is developed is there an entity that can actually execute it? Do we really need yet another strategy?

  It should also be considered and discussed if a marine biotech SRA will have more impact and will be more cost effective when developed in the framework of the ERA-NET alone, or in partnership with other organisations such as the JPI-OCEANS within the framework of the Strategic Research and Innovation Agenda (SRIA) which will be developed by JPI OCEANS?

  If it is agreed to develop an SRA for Marine Biotechnology research in the frame of the ERA-NET, following actions could be considered:

  i. Develop a draft research plan for discussion based on (i) the vision for European Marine Biotechnology Research of the Marine Board-ESF position paper; and (ii) the identification of opportunities and challenges as a consensus among the interested funding organisations.

  ii. Implement a broad stakeholder consultation to shape the roadmap and finally the SRA.

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6 Possible format and approach of the ERA-NET

The approach taken should aim to maximise actions that deliver concrete usable outputs rather than developing complex structures and engaging into intricate and time consuming strategic planning exercises with no practical use or impact. For example, the structure developed by the SEAS-ERA project with a complex regional and thematic matrix approach is not recommendable in this case. Should regional issues appear they can be dealt with 'ad hoc'.

Important support material is already available so that the ERA-NET can focus on specific actions with direct outputs framed in a long term perspective using a structure with a pan-European scope which is 'as light and straightforward as possible'.

This will, as brought up earlier in this document, require the identification, selection and occupation of a carefully delineated niche for the ERA-MBt with a clear focus. The ERA-PLATFORM can be used as a key vehicle to communicate and streamline activities with other relevant ERA-NETS as well as considering other structured and more '*ad hoc*' interaction modes with other initiatives to avoid duplication of effort and maximise synergies (see also Annex 3). Nevertheless, other ERA-NETs such as MARINERA, AMPERA, SEAS-ERA, ERA-IB/IB2, etc. may serve as inspiration for potentially useful formats and structural elements.

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7 Conclusions and recommendations for developing the ERA-MBt proposal

In summary, the following key recommendations should be considered during the development of the ERA-MBT proposal:

- The proposal should very clearly respond to the call by addressing all key issues and requirements it raises.
- The ERA-NET structure should be kept light and focus on concrete and achievable objectives.
- There are already many other initiatives working on the coordination of funding programmes (e.g SEAS-ERA, JPI Oceans, ERA-IB/IB2, …). It will be important to ensure that the proposal is as specific as possible in terms of the activities and the position of the ERA-MBt in the wider ERA-landscape to avoid confusion and overlaps.
- Recognise that there are huge differences in the ways in which different countries are supporting Marine Biotechnology research: some countries have very specific dedicated strategies and programmes on marine biotech, others have no specific focus on Marine Biotechnology and support relevant activities as part of wider biotech or marine research programmes. This may call for considerable emphasis on further promoting the development of dedicated marine biotech policies, strategies and programmes at the national level. Relevant activities include:
    - Develop a 'Funders' Platform' to exchange information, ideas, best practices and lessons learned among peers from RFOs.
    - Attempt to align different approaches and research efforts at national, regional and European level.
    - Strengthen the communication strategy and making full use of the portal as a core communication instrument to further build the identity and awareness for the relevance of marine biotech.
- Consider all tasks very carefully and make sure that all tasks survive the following pass-fail criteria (remove or reformulate tasks which do not correspond to these criteria):
    - **S**pecific
    - **M**easurable
    - **A**chievable (within the project and given duration)
    - **R**elevant (would it be a problem if the tasks is not done)
    - **T**imely, Time-dependent and Tangible
    - Cost-effective (is it worth the investment? Cost/benefit)

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  - Have not been done before (e.g. in CSA or in other priority setting exercises such as the CWG and or MB Position Paper)
  - Have a clear target or client (is someone waiting for this information or deliverable – who? What exactly does he/she need? Does the deliverable address these needs?)

- Focus on deliverables that are achievable and immediately useful rather than complex quantitative and qualitative analytical exercises, for example:
  - Focus on writing a set of about 10 Priority topics for competitive research which can be fully or partially taken up by the European Commission as well as by Member and Associated States in their Research Programmes.
  - Do not focus on entering into complex procedures to set common programmes as this is often too complex and ambitious in the framework of an ERA-NET – however, some activities in the ERA-NET (e.g. Developing a research plan or focussed strategic research agenda) might provide useful information for eventually working towards common programme in the given area (in later projects or common programming initiatives).
  - The Stakeholder Group suggested that a list of PhD courses in the EU would be useful as well as specific marine biotech summer school and training courses. In particular promoting 'work-place training' which combines academic training with or within industry would be interesting to consider as it allows to comply to the needs of industry (e.g. there is a need for training on photobioreactors as there's a lack of trained personnel in the field).
- Where complex and ambitious tasks are required, ensure building in enough fail-safes and fall-back options should it be impossible to realise desirable targets that are dependent on external factors.
  - For example, while Joint Calls are specifically mentioned in the call text, in the given economic climate it might not be possible for many countries to secure funding for participation in a Joint Call. Should this be the case, it would be good to be able to fall back on mechanisms that would still allow fruitful collaborations and outputs which lead to a successful project even if no Joint Calls are launched.
- It is recommendable that the positioning and interaction with external groups is part of the coordination work package.

To conclude, perhaps the most important pitfall to avoid is considering this as 'yet another ERA-NET', implementing generic ERA-NET tasks and activities without really focussing on the specificities and needs of Marine Biotechnology and without properly taking into account the substantial science policy work that has already done leading up to this point.

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Annex 1. The call text of July 10th 2012 for an ERA-NET in Marine Biotechnology

Area 2.3.2 Marine and fresh-water biotechnology (blue biotechnology)

The economic and scientific potentials of aquatic environments (principally marine but including freshwater also) remain insufficiently explored using the power that modern biotechnology provides. Moreover, their resources remain largely untapped by European industry. Extreme or specific environmental conditions (e.g. in temperature, pressure, salt content, pH, chemical composition) and the enormous biodiversity of these ecosystems offer multiple opportunities for bio-prospecting, exploitation and use of microbes (e.g. cyanobacteria, fungi), plants (micro- and macro-algae) and animals (e.g. fish, molluscs, sponges) and their physiological performance and genes. This can lead to novel products or sources for industrial applications (e.g. bio-processing, biomass, bio-energy, bio-materials, specialties, pharmaceuticals, and aquaculture) and beyond.

KBBE.2013.3.2-01: Marine biotechnology ERA-NET

Call: FP7-ERANET-2013-RTD

Cooperation between European research funding bodies in the area of Marine Biotechnology started in FP7 under the umbrella of the KBBE-NET high-level group and continues within the ERA-NET Preparatory Action which is providing a successful forum for the exchange of information, and has initiated the process of identifying complementarities between the research funding bodies, thus creating a basis for developing future joint, transnational calls.

The proposed network of European research funding bodies in the area of Marine biotechnology will thus build upon these previous initiatives and will capitalise on its achievement, such us, the analysis of the current landscape in Europe and beyond, the mobilisation of key stakeholders as well as the set up of initial cooperation tools to develop joint programmes and pool resources for collaborative research at European scale.

The overall aim of this ERA-NET is to further increase the level of coordination between European research funding bodies in the area of Marine Biotechnology, seeking complementarities between national activities and pooling resources to undertake joint funding of transnational projects.

Research collaborations should serve to tackle scientific and industrial challenges to establish Europe as a world leader in strategically-important areas of Marine Biotechnology and to better integrate and rationalise existing infrastructures and databases. These collaborations will address the important role of Marine Biotechnology for the development of related industries.

The network should seek to expand the previous ERA-NET preparatory action membership to include new funding bodies from other Member States and Associated Countries. In setting priorities for the network's activities it is important that complementarity with other

FP7 initiatives is sought and that interactions are established with related ERA-NETs and ETPs

across the marine and relevant sectors. It is expected that the opportunity for future global initiatives in the area of Marine Biotechnology will also be analysed.

Funding scheme: Coordination and Support Action (coordinating action).

Eligibility and evaluation criteria: please refer to Annex 4 of the Cooperation Work Programme including the Call Fiche "FP7-ERANET-2013-RTD".

FP7 Cooperation Work Programme: Food, Agriculture and Fisheries, and Biotechnologies

Expected impact: The project supported under this topic should lead to a greater integration of research actors and activities from across the enlarged European Union, and the candidate countries. It is expected that the proposal will consolidate the basis for further coordination efforts in the area of Marine Biotechnology; seek for complementarities between national activities, and start pooling resources for funding and implementing future research activities in a synergistic manner. Ultimately, the cooperation should lead to a self-sustainable and long lasting network of programme managers in the area of Marine Biotechnology, enabling the translation of information gained from innovative fundamental research into social, environmental, geographical and economic benefits. The European added value lies in supporting and enhancing the ERA in the field of Marine Biotechnology.

Annex 2 - Definition of Marine Biotechnology (from ESF Marine Board Position Paper 15)

Biotechnology, and in turn, Marine Biotechnology, means different things to different people. The OECD defines biotechnology as '*The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services*'. This definition covers all modern biotechnology but also many more production related and traditional borderline activities used in agriculture, food and beverage production (e.g. cheese and beer). Nowadays, biotechnology is more often considered in terms of cutting-edge molecular or genomic biological applications where molecular or genetic material is manipulated to generate desirable products or other benefits. What we consider as biotechnology, therefore, largely depends on what techniques we include and this is linked, in turn, to what we wish to address. **Marine Biotechnology** encompasses those efforts that involve marine bioresources, either as the source or the target of biotechnology applications. In many cases this means that the living organisms which are used to develop products or services are derived from marine sources. At the same time, if terrestrial organisms are used to develop a biosensor which is used in the marine environment to assess the ecosystem health then it also falls within the sphere of Marine Biotechnology.

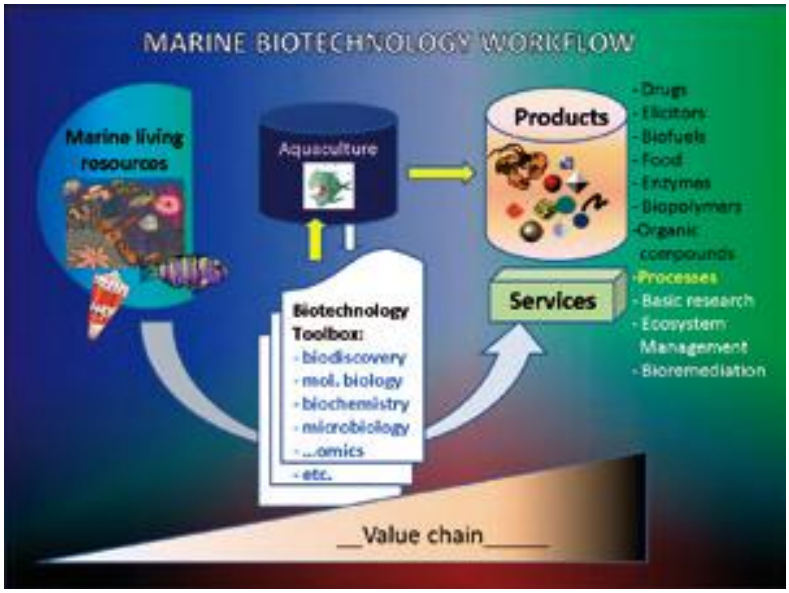

Figure 1. Marine Biotechnology Workflow. Marine Biotechnology is part of global biotechnology and its specificity lies in the uniqueness of marine living resources and their derived products and services through the use of a set of tools ranging from biodiversity assessment to systems biology, from cultures to engineering.

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Annex 3: Orientation Paper on the specificities of an ERA-NET in Marine Biotechnology

Orientation paper: The specificities of an ERA-NET in Marine Biotechnology (developed as an internal discussion paper for the CSA MARINEBIOTECH Strategic Forum)

Introduction

On July 10th 2012 the European Commission published its final call for projects under its Seventh Framework Programme. The call invites proposals to establish an ERA-NET in Marine Biotechnology. The call text (see Annex 1) clarifies the general goals and values expected to be achieved from this ERA-NET. It is therefore up to the stakeholders interested in forming an ERA-NET consortium, and particularly the funding agencies, to develop the concept of how added value will be achieved through an ERA-NET in this area. This will require reflection on how a Marine Biotech ERA-NET relates to other ERA-NETs, coordination activities and projects. The aim of this orientation paper is to stimulate the development of a common understanding of how an ERA-NET may add value to the existing landscape and strengthen Marine Biotech research and development in Europe.

This orientation paper has been developed in the framework of the FP7 Coordination and Support Action (CSA) on Marine Biotechnology, CSA MARINEBIOTECH (October 2011-March 2013). The CSA-MARINEBIOTECH aims to prepare the grounds for a potential future Marine Biotech ERA-NET by engaging with interested funding agencies and stakeholders, and by developing possible approaches, ideas and options for the ERA-NET. An ERA-NET consortium of funding agencies which will be consolidated for the proposal development, will have the ultimate responsibility for shaping the details of the ERA-NET and for drafting the ERA-NET application.

For conciseness, background information about the CSA-MARINENIOTECH and outputs of other strategic Marine Biotechnology initiatives are not included in this document. It is particularly recommended to consult following reports[6].

(i) The report from Workshop 1 in Faro, April 2012.

(ii) The ESF Position Paper 15 on Marine Biotechnology (September 2010), for a more general introduction to Marine Biotechnology, gap analyses, identification of research priorities and recommendations for future actions.

[6] Can be downloaded from www.marinebiotech.eu.

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(iii) The scoping Paper of the European Commission Collaborative Working Group on Marine Biotechnology (EC CWG-MB) with a preliminary mapping of common areas of interest of participating European Countries.

Marine Biotechnology

Biotechnology can be described as '*the application of biological knowledge and techniques to develop products and other benefits*'. Due to its broad definition and scope, biotechnology has different meanings depending on the context. Marine biotechnology has the same basic characteristics as biotechnology in general, but the focus is restricted to developing the technology in relation to the marine environment (see Addendum 1).

The notion "*Marine Biotechnology*" has facets ranging from off the shelf use of –omics methods in marine related R&D projects by academy and industry, through applications in products and processes in the industry, to the intricate developments of the technology and knowledge itself. There are no strict borders between these areas, as the technology is developed through R&D projects generating knowledge and giving new insight and innovations that will improve the technological possibilities.

Due to the broad concept and many practical implementations of Marine Biotechnology, an ERA-NET needs to clearly communicate where it is placed in the European Research Area (ERA)-landscape. In the ERA, there are a number of FP6 and FP7 ERA-NETs, technology platforms and coordination activities dedicated to the study, valorisation and value creation relevant to the marine environment. The activities listed in Table 1, directly or indirectly mention Marine Biotechnology in strategic documents or are conceptually associated with it. However, none of the listed initiatives are primarily focused on Marine Biotechnology as a whole or on the scope for positive interactions across marine topics, mediated through Marine Biotechnology.

Why an ERA-NET in Marine Biotechnology?

This chapter introduces a framework that is meant to stimulate the dialogue about the basis for a dedicated ERA-NET in Marine Biotechnology and its added value for European R&D and industrial development.

Biotechnology has developed from the basic life sciences often related to the medical disciplines, and it has naturally grown and moved the borders in synergy with the knowledge and needs in these fields. Hence, medical biotechnology is a strong and well-developed sector with a long history. The same goes for agricultural biotech as domestic animals, crops and microorganisms share much of the same biochemistry, so applications and further developments within the land based disciplines have evolved rather "easily". The marine environment, on the other hand, has until recently been quite unexplored in relation to

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biotechnology as an enabler for exploration and exploitation. One reason may be the different chemistries; another reason may be the inaccessibility of marine biotic resources. To address this inequality and boost the progression towards a sustainable utilisation of the vast ocean resources within the framework of the bioeconomy, a focus is needed to develop the toolbox and knowledge for Marine Biotechnology as laid out in this paper, but also other areas should be addressed.

Table 1 list central ERA programs relating to aspects of "*Marine Biotechnology*" in their scope or aims. For them it is regarded as an enabling technology; a toolbox of methods and knowledge to be used in achieving their higher level challenges. Although they need to utilise the forefront of the technology and knowledge base, they do not have the objectives, monetary or other resources to move the cutting edge of Marine Biotechnology research and development significantly forward at the same time. They nevertheless have a significant role to play in guiding the directions for the technology and knowledge developments. An ERA-NET focusing on the development of biotechnological tools and knowledge for and from the marine environment can provide a significant contribution to this landscape. Also for the development of sustainable and competitive industries.

Table 1: Overview of Marine Biotechnology related European activities (not exhaustive)

Activity	General aims
JPI- OCEANS **http://** http://www.jpi-oceans.eu	A Joint Programming Initiative to meet the Grand Challenges regarding European Seas and Oceans. The JPI Oceans aims to add value by: • avoiding fragmentation and unnecessary duplication • planning common and flexible initiatives • facilitating cooperation and foresighting • establishing efficient mechanisms for interaction and knowledge transfer between the scientific community, industry & services, and policy makers at high level.
SEAS-ERA **http://www.seas-era.eu**	A network of Marine Research Funding Organisations consisting of 21 partners and 2 third parties. The principle aims of the SEAS-ERA Network are to improve coordination activities between nationally competitive marine research programmes. A continuation of previous ERA-NETs. Ends in 2014.
MG4U **http://www.mg4u.eu**	The EU coordination action Marine Genomics for Users (MG4U) main objectives are to facilitate knowledge transfer, technology transfer, and technology translation between high-throughput marine genomics, industry and society.
ERA-IB2 **http://www.era-ib.net**	ERA-IB2 is an ERA-NET in industrial biotechnology (IB) involving 19 partners, which builds on the success of the FP6 project ERA-IB and develops the network further into a pan-European approach to IB R&D funding.

MarBEF+ **http://www.marbef.org**	A network of excellence funded by the European Union and consisting of 94 European marine institutes. This platform aims to integrate and disseminate knowledge and expertise on marine biodiversity, with links to researchers, industry, stakeholders and the general public.
EuroMarine **http://www.euromarineconsortium.eu**	A network of excellence that brings together 3 FP6 marine networks of excellence (EurOceans, MarBEF and Marine Genomics Europe). It aims to Integrate research from genes to marine ecosystems; to better understand how marine organisms and marine ecosystems function; and to support the sustainable use of the seas and oceans for the increasing needs of society.
Marine relevant European Technology Platforms (ETPs).	Industrial development and networking for the development of the bioeconomy.

What should be the position and focus of an ERA-NET?

To be efficient and effective, the ERA-NET consortium will have to consider its position within the complex and dynamic landscape of existing, and emerging collaborations, initiatives, and projects.

At this stage, it is envisaged that an ERA-NET in Marine Biotechnology should be placed in the ERA-landscape to support and strengthen the availability and development of cutting edge biotechnology tools and knowledge with other activities and the industries. This can only be achieved in close interactions with the users where the "technology push" and the "market pull" are in dynamic interaction. The ERA-NET PLATFORM's objectives are to facilitate these interactions between KBBE relevant activities[7].

The aims for an ERA-NET in Marine Biotechnology could be (not extensive):

- In close collaborations with other programs in the ERA to
    - stimulate innovative, new ways to use biotechnology tools to drive the knowledge and technology forward.
    - develop the biotech tools in cutting edge projects.
    - tackle the needs of researchers and stakeholders in ensuring that the toolbox already available today is used more efficiently, effectively and applied in more projects.
- As own activities

[7] https://www.era-platform.eu/index.php?index=6

- Identify gaps where Marine Biotechnology needs a specific focus to develop areas not included in other activities (e.g. biodiscovery, marine model organisms, …).
- Access to biodiversity IPR and sustainability challenges.
- Dissemination of the uses and possibilities embedded in an enabling technology like marine biotech.

Some areas where toolkit and knowledge developments are needed have been mentioned in the CWG-MB report and the ESF Position Paper15. Such as: molecular biology applied to aquaculture (molecular aquaculture), marine metagenomics, development of marine model organisms and systems for studies of the marine environment, and development of –omics tools suited for studies related to the marine environment (e. g. biodiscovery, process technologies, etc.).

Many more are relevant, and based on the output from the CSA-MARINEBIOTECH, the consortium forming the ERA-NET in Marine Biotechnology will enter into fruitful discussions to elaborate this in detail. The aim will be to find focuses where transnational collaborations to develop the toolbox and enrich downstream applications can be realised in close interactions with exiting and up-coming thematic European activities. The specific tools needed for the industries to develop value and employment from exploring and exploiting marine resources will also be addressed.

To sum up, a few guiding principles can already be made at this stage serving as orientation for the interested funding agencies:

<u>The ERA-NET should:</u>

- Avoid duplication of existing efforts.
- Ensure complementarity with other initiatives and projects.
- Take into account specific marine biotech research/knowledge needs of other actors, platforms and initiatives and where relevant aim to satisfy those needs (i.e. identify and fill the gaps).
- Established interactions with related ERA-NETs, ETPs and other initiatives across the marine and other relevant sectors.
- Aim to identify and support activities which will be most effective, where the return does not have to be in monetary terms per se.
- Set up of cooperation tools to develop joint programmes and pool resources for collaborative research at European scale.
- Take into account Global trends and identify areas where Europe would benefit from collaborating with international initiatives or specific players.

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In addition the overarching rationales should be that an ERA-NET:

- must make an important contribution towards meeting the 'Grand Challenges' for the 21st century and the development of greener, smarter economies that are central components of the Europe 2020 Strategy.
- is a strong driver for the development of the oceans to contribute to the implementation of the bioeconomy as laid out in Bioeconomy 2030 - the European Strategy for a Bioeconomy "INNOVATING FOR SUSTAINABLE GROWTH: A BIOECONOMY FOR EUROPE".

The CSA-MARINEBIOTECH

August 2012

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Annex 4. Overview of key Marine Biotechnology Science Policy docs/events since 2000

Marine biotechnology is recognised as being central in delivering on the potential of the oceans to contribute to the sustainable delivery of food, energy and biomaterials, as well as to improvements in environmental and human health. Scientists, policy makers and industry representatives have contributed to the development of this vision for Marine Biotechnology.

Below is an overview of the most important documents and recent events highlighting the relevance of Marine Biotechnology and providing key recommendations and guidance on how to develop thriving European Marine Biotechnology sector[8].

- **2011-2013 –** CSA MARINEBIOTECH **(www.marinebiotech.eu)**

FP7 Coordination and Support action aiming to prepare the foundation for an ERA-NET in the area of Marine Biotechnology which requires:

- **2010 -** Marine Board-ESF Position Paper 15: Marine Biotechnology: a New Vision and Strategy for Europe (www.marineboard.eu/publications)

This paper calls for the development of a European Marine Biotechnology strategy. In doing so, it highlights the potential of Marine Biotechnology to impact Europe's economy and stresses the importance of including Marine Biotechnology topics in future Framework Programmes.

- **2009 -** EU KBBE-net Coordinated Working Group on Marine Biotechnology (CWG-MB) (http://www.marine.ie/NR/rdonlyres/B8CD4BDE-FE7B-4218-AB2F-DEDFE5421F9D/0/CWGMBtoKBBEnetreportdistributed.pdf)

  In this Marine Biotechnology scoping paper, EU member states identified marine research priorities to contribute to the structure of EU Framework Programme for Research and Technological Development.

- **2008 -** European Strategy for Marine and Maritime Research from the European Commission (http://ec.europa.eu/research/press/2008/pdf/com_2008_534_en.pdf)

[8] Among other based on information from the Marine Institute Ireland at http://www.marine.ie/home/research/SeaChange/NationalMarineBiotechnology/Marine+Biotechnology+Policy+Initiatives.htm

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This strategy highlights the need for marine biodiversity and biotechnology research and recognises their potential to contribute new knowledge for high value added products and processes.

- **2008 -** "Blue Book" from the EC-US Task Force on Biotechnology Research - Workshop - Principality of Monaco, 2008 (http://ec.europa.eu/research/biotechnology/eu-us-task-force/index_en.cfm?pg=workshop_past)

Microbes play an important role in the marine and indeed global ecosystem. The importance of developing marine genomics expertise, including the need for research to strengthen Europe's bioinformatics research capability was the focus of this Task Force meeting.

- **2007 -** "The Bremen meeting" of European Marine Biotechnology experts, hosted by the German EU presidency (http://www.marine.ie/NR/rdonlyres/813867B4-C1B6-4259-BE06-7B25C62815BF/0/37bremenmarinebiotechnologyresearch_en.pdf)

Led by the European Commission and attended by representatives from industry and Europe's Marine Biotechnology research community, this meeting highlighted the importance of the EU Framework Programme in supporting Marine Biotechnology research and called for the development of a European Marine Biotechnology research strategy.

- **2006 -** EC background paper no. 10 on Marine Biotechnology (http://www.marine.ie/NR/rdonlyres/C756DB2F-4A83-4E67-9C66-168A0EC17CCA/0/ECbackgroundpaperNo10onMarineBiotechnology2006.pdf)

This paper recognised the commercial potential of Marine Biotechnology research in the development of different industry sectors, such as agriculture, health, food products, process engineering, environment and energy. It identified a range of commercial applications that Marine Biotechnology would support, including: biodiscovery; improving the production of marine organisms; novel products - both food and feedstock; and uses in diagnostics and biosensor applications.

- **2005 –** The CIRCA Report on Marine Biotechnology (http://www.marine.ie/NR/rdonlyres/9FC1F9CA-5B8A-4442-A273-9B0C2060DDFE/0/CIRCA_2004.pdf)

An Irish funded study providing an overview of Marine Biotechnology and makes recommendations about how Ireland could develop capabilities in Marine Biotechnology.

- **2002 -** US National Academy of Sciences published a report entitled Marine Biotechnology in the Twenty-first Century: Problems, Promise, and Products.

- **2001 -** ESF Marine Board Position Paper 4: A European Strategy for Marine Biotechnology (www.marineboard.eu/publications)

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Annex 5. The ERA-NET Scheme

The objective of the ERA-NET scheme is to step up the cooperation and coordination of research activities carried out at national or regional level in the Member States and Associated States through:

- the networking of research activities conducted at national or regional level, and
- the mutual opening of national and regional research programmes.

The scheme aims to contribute to making a reality of the European Research Area by improving the coherence and coordination across Europe of such research programmes. The scheme also aims to enable national systems to take on tasks collectively that they would not have been able to tackle independently.

Both networking and mutual opening require a progressive approach. The ERA-NET scheme therefore has a long-term perspective that must also allow for the different way that research is organised in different Member States and Associated States.

Definition of research activities carried out at national or regional level

The 'research activities' carried out at national or regional level should be understood as full research and innovation programmes, part of such programmes, or similar initiatives. Typically, such activities should be:

- strategically planned;
- executed at national or regional level; and
- financed or managed by national or regional public bodies or by structures closely related to or mandated by public authorities

Participating in ERA-NET

The participants in ERA-NET should be:

- public bodies responsible for financing or managing research activities(1) carried out at national or regional level
- other national or regional bodies that finance or manage such research activities bodies operating at European level whose mission includes the pan-European coordination of nationally-funded research activities(2)

The legally established minimum number of participants for each of the two instruments given below must only include entities belonging to the above three categories. However, over and above this minimum, the following may also participate and receive Community funding: legal entities, such as charities or other private organisations which also manage research programmes that are strategically planned and executed at national or regional level.

For more information consult http://www.cordis.europa.eu/coordination/era-net.htm, in particular the downloadable documents:

- ERA-NET in FP7
- Some suggestions for the preparation of an ERA-NET Coordination Action (CA)

- Frequently asked questions

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Annex 6. Summary of the recommendations from the Stakeholders Group to the Marine Biotech ERA-NET (ERA-MBt) consortium

Recommendation 1. Consolidate the CSA Stakeholder Group (SG) into an ERA-MBt Stakeholder Platform and ensure active participation of stakeholders in the ERA-MBt activities

- Ensure a healthy balance of stakeholders using (1) existing networks and platforms of stakeholders at various levels (e.g. European Marine Board, World Ocean Council, EuropaBIO, regional/local clusters, technology platforms, …), filling the gaps and strengthening the group by inviting (2) experts and representatives of individual organisations, SMEs and large industry with relevant expertise.

- Develop appropriate mechanisms for the Stakeholder Platform to advise the funding agencies on trends and developments, stakeholder needs, and thus what is needed and wanted from a marine biotechnology ERA-NET. This can be done among other by

    - Organising dedicated stakeholder workshops, preferably run by an external moderator, to develop ideas and topics for joint ERA-MBt activities, including thematic R&D workshops and joint calls;

    - Developing a virtual meeting place and information exchange hub (via the www.marinebiotech.eu portal) which allows for regular interactions, information updates and regular feedback on the ERA-MBt activities and future actions.

Recommendation 2. Take an industry-academic collaborative approach, ensuring appropriate industry involvement in the ERA-MBt

- Industry should be actively involved in the ERA-NET, both at the level of identification of topics (e.g. through engagement in the Stakeholder Platform) as well as by possible participation in joint activities and funded projects.

- Fund as much/many as possible activities to bridge academic-industry barriers to overcome financial difficulties of 'proof of concept', demonstration and scale-up activities; calls should be simple, reactive and fast.

- Consider options to facilitate access of SMEs to equipment and technology platforms (by direct funding or indirectly by making available information about existing channels and opportunities to gain access).

Recommendation 3. Drastically increase efforts to map and better understand the European marine biotechnology landscape

- Increase efforts to map the European marine biotech landscape, digging deeper and wider, and update the on-line registry accordingly. Particular efforts should be undertaken to map industry activities, especially SMEs, as well as existing industry-

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academic relationships and knowledge networks (e.g. through in-depth Knowledge Capture Mechanisms using patents of Marine Genetic Resources).

- Make full use of the Stakeholder Platform to provide insight into the SME landscape, needs and concerns.

- Consider subcontracting (do not define to whom in advance – open call for tender) a market study to obtain in-depth information about the contribution of marine biotechnology to the European bio-economy.

Recommendation 4. Ensure that a central component of the ERA-MBt (and its budget) is dedicated to communication, outreach and providing access to relevant information to mobilize a broad European marine biotech research community

- Use professional public relations and communications services to assist with communication, dissemination and outreach products and efforts towards various targets based on a dedicated communication strategy.

- Provide open access to well organised and user-friendly information:

    - Further elaborate the www.marinebiotech.eu portal as a central community and information hub providing information and services (e.g. workspace, brokerage space, update, event calendar, databases, weekly updates, videos with success stories, lab presentation pitches, …).

    - Further build the organisations-registry/database including SMEs and industries involved in marine biotech in Europe, if possible with statistics data. Provide a section where organization may profile the services they can provide.

    - Create a virtual network of Biobanks and Repositories linked to screening facilities and provide access to relevant databases to facilitate access to information and biological materials from these Biobanks and Repositories. Work together with other initiatives and projects working towards the same achievements (e.g. FP7 MaCuMBa, ESFRI EMBRC, …).

- Develop an info-pack/pages for new stakeholders that want to get involved: 'How to participate as a newcomer'.

- Consider IP issues, the application of the Nagoya protocol on ABS and other legal/policy barriers together with other initiatives/projects such as EMBRC, SeaBiotech, Bluegenics, PharmaSea and MicroB3. The ERA-NET should link with these initiatives and fill the gaps where necessary and appropriate to develop a fully functional and comprehensive User Toolkit on IPR/ABS by 2016 made available on www.marinebiotech.eu.

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Recommendation 5. Organise a series of thematic research workshops and support training activities

- Organise a series of topical workshops bringing together principal investigator of national research efforts in specific research areas, as well as private sector researchers or representatives, to discuss state of the art and progress and forge potential pan-European networks for participation in later calls – some workshops should focus on needs of SMEs.

- ERA-MBt should support training activities (e.g. master classes/courses, summer courses, master courses) on various topics including

    - Acquisition of 'soft' skills in management, business, economics and entrepreneurship

    - Insight into legal and IP/ABS issues, including Nagoya protocol status and implications.

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